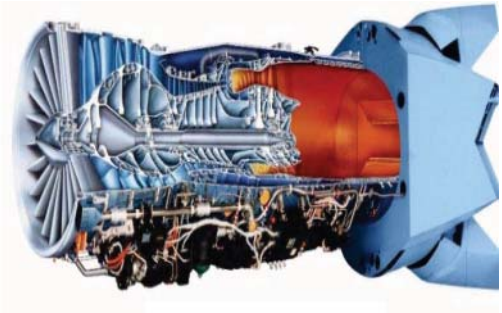
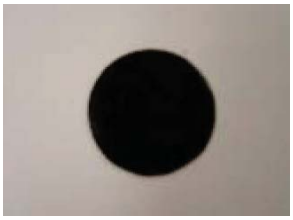
Inorganic-Organic Hybrid Polymers for High-Temperature Applications



Turbine aircraft engine



Thermal-cured diacetylenes yield opague plastics and elastomers

Ambient-cured vinyls yield clear plastics and elastomers

DESCRIPTION:

The comprehensive class of plastics, elastomers, and ceramics derived from the inorganic-organic hybrid oligomers of organic unsaturated-containing poly(carboranylenesiloxanes) is ripe for development for aerospace, marine, and electronic applications. The crosslinked network polymers and ceramics formed from the precursors show indefinite thermo-oxidative stability in air at 510 °C (950 °F) and to at least 1500 °C (2730 °F), respectively. The diacetylene-containing hybrids require thermal treatment for curing, whereas the vinyl- and ethynyl–containing hybrids can be cured under ambient conditions. While the network polymers possess all of the inherent siloxane characteristics, they are highly insulating in nature, with exceptional high-temperature dielectric stability under high voltages.

ADVANTAGES/FEATURES:

- Organic unsaturated-containing poly (carboranylenesiloxanes) materials are viscous liquids at room temperature and are easily processed into shaped configurations.
- Opportunity for conversion of the materials into network polymers at room temperature or at elevated temperatures gives a broad range of applications for these materials.
- Structural characteristics of these materials can be easily controlled by the dilution of the crosslinking density in the materials.
- Plastics, films, and fibers can be formulated from the liquid precursors.
- Structural components can be readily fabricated by cost-effective methods such as resin transfer molding, resin infusion molding, and filament winding.
- Licensable under U.S. Patents 6,787,615 B2; 6,784,259 B2; 6,767,981 B1; 6,579,955 B2; 6,362,289; 6,265,336; 6,225,247 B1; 6,187,703; 6,025,453; 5,986,032; 5,981,678; 5,969,072; 5,932,335; 5,874,514; 5,844,052; 5,807,953; 5,780,569; 5,756,629; 5,681,870; 5,679,818; 5,563,181; 5,552,505; 5,483,017; 5,348,917; 5,292,779; and 5,272,237.
- Patents pending: Navy cases 96,470; 95,783; 84,441; and 84,545.

APPLICATIONS:

- Aerospace - engine applications
- Insulative coatings for high-performance organic and metal fibers
- High-temperature adhesives
- Polymeric precursors for nanomaterials
- High-temperature dielectrics for electronic applications
- Repair of space vehicles while in orbit
- Neutron absorbers – nuclear storage containers and shields

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